

What Is Claimed Is:

91 Sub

1. A laser diode module comprising:

a laser diode;

an optical system including an optical fiber and a lens portion, said optical system being configured to receive and transmit a beam emitted from said laser diode through said lens portion to said optical fiber along an optical axis;

a base configured to support said laser diode and at least a portion of said optical system, said base including a structural support member configured to prevent warping of said base, said structural support member extending along said base in a direction generally parallel to said optical axis; and

a bottom plate configured to support said laser diode, said optical system, and said base.

2. The laser diode module according to Claim 1, wherein said base includes a plurality of structural support members extending along said base in a direction generally parallel to said optical axis.

3. The laser diode module according to Claim 1, wherein said structural support member extends along said base on a first side of said optical fiber, and wherein said base further including an additional structural support member extending along said base in a direction generally parallel to said optical axis, said additional structural support member extending along said base on a second side of said optical fiber, said second side being opposite to said first side.

4. The laser diode module according to Claim 1, wherein said optical fiber has a portion contained within a holder.

5. The laser diode module according to Claim 1, wherein said lens portion is a discrete lens supported by said base.

6. The laser diode module according to Claim 5, wherein:
said optical system further comprises an optical isolator supported by said base; and
said optical system is configured to receive and transmit the beam emitted from said laser diode through said discrete lens and said optical isolator to said optical fiber along said optical axis.

7. The laser diode module according to Claim 6, wherein:
said discrete lens is fixed to a holder; and
said base comprises a laser diode mounting member and a holder mounting member mounted to said laser diode mounting member, said laser diode mounting member supporting said laser diode and said holder mounting member supporting said holder.

8. The laser diode module according to Claim 7, wherein said optical isolator is mounted to said holder mounting member.

9. The laser diode module according to Claim 8, wherein said base further comprises a fastening member, said holder being coupled to said holder mounting member by said fastening member.

10. The laser diode module according to Claim 5, wherein said optical fiber is supported by said bottom plate.

11. The laser diode module according to Claim 10, wherein:
said optical system further comprises a second lens supported by said bottom plate;
and

said optical system is configured to receive and transmit the beam emitted from said laser diode through said discrete lens and said second lens to said optical fiber along said optical axis.

12. The laser diode module according to Claim 11, further comprising a package including said bottom plate, said package being configured to support said second lens and said optical fiber.

13. The laser diode module according to Claim 5, wherein said base is directly fixed on said bottom plate.

14. The laser diode module according to Claim 5, wherein said base is fixed on said bottom plate via a thermo module.

15. The laser diode module according to Claim 1, wherein:

said base comprises a laser diode mounting member and a holder mounting member mounted to said laser diode mounting member, said laser diode mounting member supporting said laser diode and said holder mounting member supporting said holder.

16. The laser diode module according to Claim 15, wherein said structural support member extends along said holder mounting member.

17. The laser diode module according to Claim 15, wherein said structural support member extends along said laser diode mounting member.

18. The laser diode module according to Claim 15, wherein said laser diode mounting member has a U-shaped cross-sectional area taken along a plane transverse to said optical axis.

19. The laser diode module according to Claim 15, wherein said holder mounting member has a U-shaped cross-sectional area taken along a plane transverse to said optical axis.

20. The laser diode module according to Claim 15, wherein said laser diode mounting member and said holder mounting member are arranged to form together a U-shaped cross-sectional area taken along a plane transverse to said optical axis, around said laser diode.

21. The laser diode module according to Claim 15, further comprising a fastening member, said holder being coupled to said holder mounting member by said fastening member.

22. The laser diode module according to Claim 21, wherein said structural support member extends along said fastening member.

23. The laser diode module according to Claim 21, wherein said fastening member has a U-shaped cross-sectional area taken along a plane transverse to said optical axis.

24. The laser diode module according to Claim 23, wherein said U-shaped fastening member has terminal end portions that each are welded to said holder at a single point.

25. The laser diode module according to Claim 21, wherein said fastening member is coupled to said holder at a location adjacent said lens portion.

26. The laser diode module according to Claim 21, wherein said fastening member is received with a recessed portion on said holder mounting member.

27. The laser diode module according to Claim 15, further comprising a plurality of fastening members, said holder being coupled to said holder mounting member by said plurality of fastening members, said plurality of fastening members being received within recessed portions on said holder mounting member.

28. The laser diode module according to Claim 1, further comprising a peltier device coupling said base to said bottom plate.

29. The laser diode module according to Claim 15, further comprising a peltier device coupling said laser diode mounting member to said bottom plate.

30. The laser diode module according to Claim 15, wherein said holder mounting member is made of a material having a thermal conductivity value lower than a thermal conductivity value of said laser diode mounting member.

31. The laser diode module according to Claim 15, wherein said laser diode mounting member has a reinforcement portion configured to mechanically reinforce said holder mounting member located in a closest position to said laser diode.

32. The laser diode module according to Claim 1, wherein said lens portion has a fiber lens formed on said optical fiber, and wherein said fiber lens has a tip end side that is arranged to be opposite a light emitting facet of said laser diode.

33. The laser diode module according to Claim 32, wherein said fiber lens is an anamorphic lens.

34. The laser diode module according to Claim 15, wherein said structural support member extends along said holder mounting member, said structural support member having a lower surface affixed to an upper surface of said laser diode mounting member, said structural support member having a portion that extends to a position alongside said laser diode.

35. A semiconductor laser diode module comprising:

a laser diode;

an optical system including an optical fiber and a lens portion, said optical system being configured to receive and transmit a beam emitted from said laser diode through said lens portion to said optical fiber along an optical axis;

a fastening means for supporting at least a portion of said optical system;

a base configured to support said fastening means and said laser diode; and

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92

Sub
92
a bottom plate configured to support said laser diode, said optical system, said fastening means, and said base,

wherein a warping preventing means for preventing warping of said base is provided on said base in a direction generally parallel to said optical axis on at least one side of said optical system.

36. The semiconductor laser diode module according to Claim 35, further comprising a thermo module coupling said base to said bottom plate.

37. The semiconductor laser diode module according to Claim 36, wherein said thermo module has a base side plate member attached to said base, a bottom plate side plate member attached to said bottom plate, and a peltier element positioned between said base side plate member and said bottom plate side plate member.

38. The semiconductor laser diode module according to Claim 36, wherein said base projects in a direction parallel to said optical axis from an end portion on an optical fiber mounting side of said thermo module.

39. The semiconductor laser diode module according to Claim 38, wherein said base has a laser diode mounting member disposed on said thermo module configured to mount said laser diode at a laser diode mounting region and a fastening means mounting member configured to mount said fastening means at a position other than said laser diode mounting region, and wherein said fastening means mounting member projects in a direction parallel to said optical axis from an end portion on an optical fiber mounting side of said laser diode mounting member.

40. The semiconductor laser diode module according to Claim 39, wherein said laser diode mounting member has a reinforcement portion configured to mechanically reinforce

said one of said plurality of fastening means located closest to said laser diode, and wherein a lower surface of said reinforcement portion is out of contact with said thermo module.

41. The semiconductor laser diode module according to Claim 35, wherein said warping preventing means is provided on at least one side of said optical axis that connects a laser beam emitting facet of said laser diode and a laser beam receiving end of said optical fiber.

42. The semiconductor laser diode module according to Claim 35, wherein a plurality of fastening means are provided to support said optical fiber at positions which are separated by a mutual interval in a direction of said optical axis.

43. The semiconductor laser diode module according to Claim 42, wherein one of said plurality of fastening means which is located closest to said laser diode is formed of an integral part provided with a clamping portion configured to contact said optical fiber on two sides thereof.

44. The semiconductor laser diode module according to Claim 35, wherein said warping preventing means is provided on said fastening means at a location on said fastening means closest to said laser diode.

45. The semiconductor laser diode module according to Claim 35, wherein said base has a fastening means mounting member on which said fastening means is mounted and a laser diode mounting member on which said laser diode is mounted, and wherein said warping preventing means and said fastening means mounting member are formed of an integral member.

46. The semiconductor laser diode module according to Claim 45, wherein said warping preventing means is formed as a wall portion extending in a direction parallel to said

optical axis, said wall portion being provided upright on at least an upper side of said fastening means mounting member.

47. The semiconductor laser diode module according to Claim 45, wherein said fastening means mounting member is formed of an Fe-Ni-Co alloy.

48. The semiconductor laser diode module according to Claim 35, wherein said fastening means is formed of an Fe-Ni-Co alloy.

49. The semiconductor laser diode module according to Claim 35, wherein said warping-preventing means is formed of an Fe-Ni-Co alloy.

50. The semiconductor laser diode module according to Claim 35, further comprising a package including said bottom plate, said package being configured to accommodate therein said laser diode, said optical system, said fastening means, and said base.

51. The semiconductor laser diode module according to Claim 35, wherein said lens portion has a fiber lens formed on said optical fiber, and wherein a tip end side of said fibrous lens and a light emitting facet of said laser diode are arranged to oppose each other.

52. The semiconductor laser diode module according to Claim 51, wherein said fiber lens is an anamorphic lens.

53. The semiconductor laser diode module according to Claim 35, wherein said lens portion is a discrete lens supported by said base.

54. The semiconductor laser diode module according to Claim 53, wherein:
said optical system further comprises an optical isolator supported by said base; and
said optical system is configured to receive and transmit the beam emitted from said laser diode through said discrete lens and said optical isolator to said optical fiber along said optical axis.

55. The semiconductor laser diode module according to Claim 54, wherein:

said discrete lens is fixed to a holder; and

said base comprises a laser diode mounting member and a fastening means mounting member mounted to said laser diode mounting member, said laser diode mounting member supporting said laser diode and said fastening means mounting member supporting said holder.

56. The semiconductor laser diode module according to Claim 55, wherein said optical isolator is mounted to said fastening means mounting member.

57. The semiconductor laser diode module according to Claim 56, wherein said holder is coupled to said fastening means mounting member by said fastening means.

58. The semiconductor laser diode module according to Claim 53, wherein said optical fiber is supported by said bottom plate.

59. The semiconductor laser diode module according to Claim 58, wherein:
said optical system further comprises a second lens supported by said bottom plate;
and

said optical system is configured to receive and transmit the beam emitted from said laser diode through said discrete lens, said optical isolator, and said second lens to said optical fiber along said optical axis.

60. The semiconductor laser diode module according to Claim 59, further comprising a package including said bottom plate, said package being configured to support said second lens and said optical fiber.

61. The semiconductor laser diode module according to Claim 53, wherein said base is directly fixed on said bottom plate.

62. The semiconductor laser diode module according to Claim 53, wherein said base is fixed on said bottom plate via a thermo module.